From the house of **Amar Chitra Katha** and **Tinkle**

BRAINWAVE™

Vol. 01
Issue 11
November 2012
Cover + 40 pages
₹50

p10 **Bermuda Triangle:**
Know the mystery

p22 **Insect repellant:**
Make one at home

p11 **Mad Maladies!**
Know the cause of diseases

8-14 years

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Fever Files

Dear Reader,

Welcome to my world of scientific madness. A madness that will spread so fast that soon, you, your parents and teachers will all be a part of it. However, unlike an infection, this madness is awesome. An infection, on the other hand, is awful. Who wants to have a fever anyway? The thought of staying in bed all day while our friends go out and play. Groan!

But just like we know our friends, we must also know our enemies. So in this issue, we encounter everyone's enemy – disease.

In addition, we're making you, dear reader, a regular contributor to Brainwave. We encourage you to write in to us with a story, a drawing and even participate in the DIY and Toybox activities. We're also incorporating a Treasure Hunt. Don't forget to check for words or phrases that have a '☜' before them.

On a final note, with this being my first issue as editor of Brainwave, I would like to thank Somesh, Aparna, Rajita and Sasikanth, the main BW team, Reena Puri, the editor of Amar Chitra Katha, and Rajani Thindiath and Savio Mascarenhas of the Tinkle team for their support. Not to forget, I owe Vinayak Varma, the founding editor of BW for starting the magazine and passing it on to me.

I look forward to a wonderful scientific life with all of you.

Scientifically,
JD
jayadev.calamur@ack-media.com

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CHATTER BOX

What happened to the red pen when it fell sick?
A: It had scarlet fever

A family is a unit composed not only of children, but of men, women, an occasional animal and the common cold. - *Ogden Nash*

Bad news: Your cancer is incurable.
Good news: You now have a lifetime supply of everything.

I was unfamiliar with Brainwave magazine before. In Bangalore Comic con, I won the mega ACK quiz. One of the gifts included Brainwave magazine. I read it and loved it. Keep it up.
Dhruva Guruprasad

Visit us at: *www.bwmag.in*

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BRAINWAVE™

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In which we learn all about diseases, how they sneak up on us, which ones are the wiliest, and how they can be vanquished

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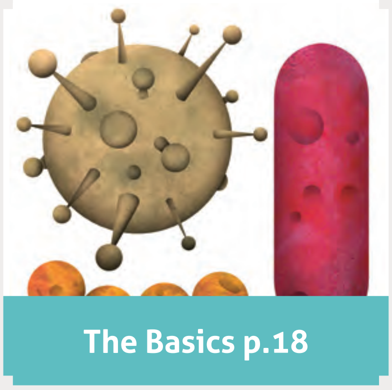

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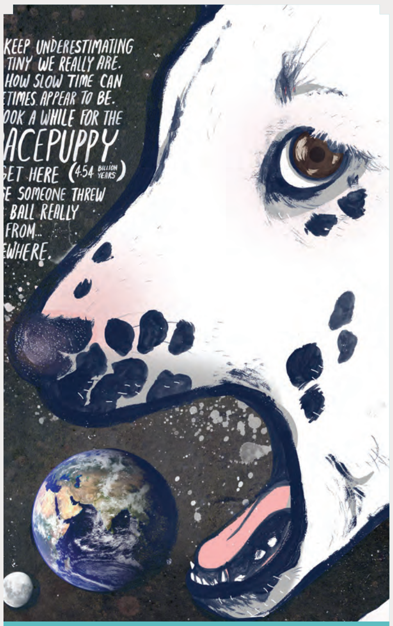

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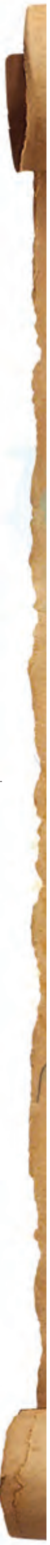

Treasue hunt idea: Veena Prasad; Artwork: Anuranjini Singh

Words tagged with a **G** are explained in the **Glossary at the end of the magazine.**

Treasure Hunt!

From this issue onwards, we at **Brainwave** are introducing a little treasure hunt. It is up to you to find the hidden secrets in the magazine, which are possible clues to what's in store next month. Search the pages. Read between the lines. Get out your magnifying glass to crack the case because, fellow-scientists, this is your gateway to a world of fun and treasure.

In this issue, there are available clues that are written in text. They could be anywhere. They could even be in the editor's note.

○○○○○○○○○

So, start hunting. The Fastest and most accurate reply gets a **wonderful gift worth ₹500.** Write in to *brainwave@ack-media.com* with 'Treasure Hunt' in the subject line.

Treasue hunt idea: Veena Prasad; Artwork: Anuranjini Singh

Sleep Like an Ostrich

We all know that nature inspires human beings to invent a lot of cool stuff. But here is an instance where a misconception about how nature really works has led a Spanish-Swiss design studio called Kawamura Ganjavian to invent a jet-lag-fighting, sleep-maintaining pillow! Most of us mistakenly believe that the ostrich likes to bury its head into the ground. In fact, it only does so briefly – to swallow pebbles that aid its digestion. But this rumour inspired the design studio to invent the Ostrich Pillow – a soft, downy contraption with a hole through which you can stick your head and an opening for your mouth to breathe through. The pillow also comes with extensions on which sleepers can comfortably rest their arms. The Ostrich Pillow will leave you so comfortably cut-off from the world that all you can do is zzzz...

Man breaks speed of sound

A skydiver managed to break the sound barrier last month. He achieved this while making the highest jump ever in the New Mexico desert in the United States. Feix Baumgartner touched 833.9 mph and achieved the record without traveling in a jet plane or a spacecraft. He took nine minutes to land. Half of the landing was a free fall that comprised 1,19,846 feet. On being asked how he felt traveling at the speed of sound, Baumgartner said, "It's hard to describe because you don't feel it."

Hunger Games

Researchers from the University of Michigan in the United States, decided to see what goes on inside the brain when people want to overeat. They found that a part of the brain called neostriatum is stimulated, which in turn releases a natural drug-like chemical called enkephalin. This triggers an individual's

image by Christian Kadluba

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urge to eat more. This chemical is present in larger quantities in an obese individual, which explains the way they react to food. Further studies may tell us exactly why some people tend to overeat. Meanwhile, the next time you want food, don't tell your mother you're hungry. Instead, just say, "My neostriatum has been activated!"

Via Current Biology

image by Alpha

Japanese Invaders

A microscopic representation of wakame, a type of algae; *image by Miheco*

When John Chapman, a marine invasive species specialist, heard of a dock that had swept up on the ocean coast in Oregon, USA, it didn't take him long to figure that it had floated all the way from Japan, thanks to the fierce tsunami that hit the island-nation over a year ago. As it made its way across the Pacific Ocean, it picked up millions of marine organisms. So, by the time it reached the Oregon coast, it was covered with oceanic life. Chapman found that some of the marine species found on the dock were highly invasive. A brown algae called wakame, for instance, can stifle entire ecosystems if its natural predators aren't present. He was also alarmed by a species of blue mussel^{G} that had covered the entire dock during its 5,000-mile journey. Although marine biologists were worried by the invasive species that had made their way from Japan to Oregon, they were also awed by the event. The opportunity to study marine life that is native to distant places is not one that crops up every day. ■

Energy Ball

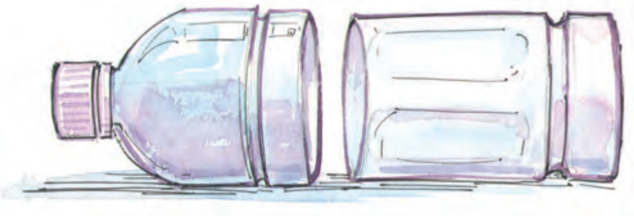
by **Arvind Gupta**

To play this game, you will need:

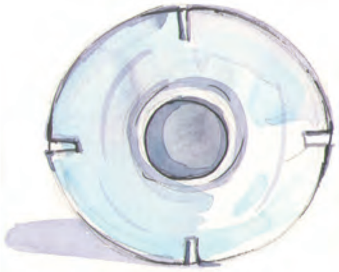
- A plastic bottle
- A small plastic ball
- Thread
- Rubber bands
- Scissors

Method:

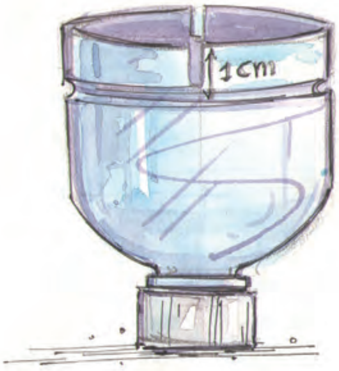
1. Cut a plastic bottle about 10cm from the cap. You can throw the bottom half away.



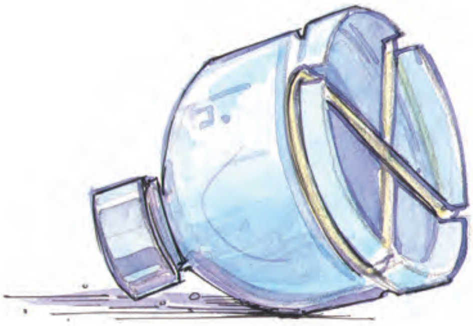
2. Mark four points on the base of the top half of the bottle, as shown in the picture.



3. Make 1cm-deep cuts along each of the four points.



4. Attach two rubber bands across the opposite cuts, so that they intersect at the centre.

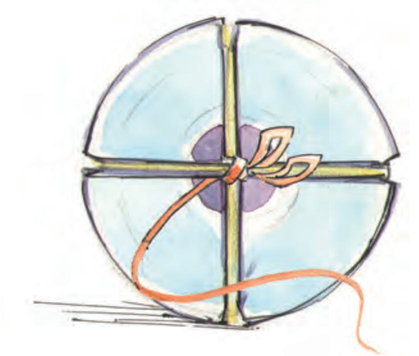


Artwork: Adarsh Achari

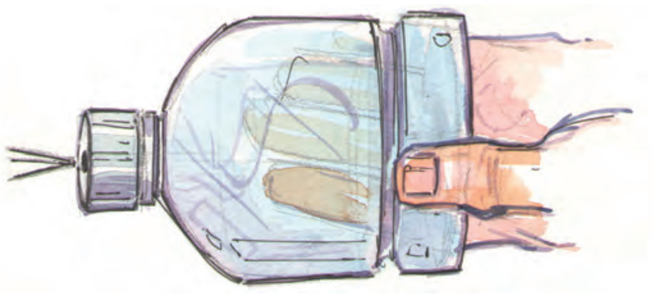
5.

7.

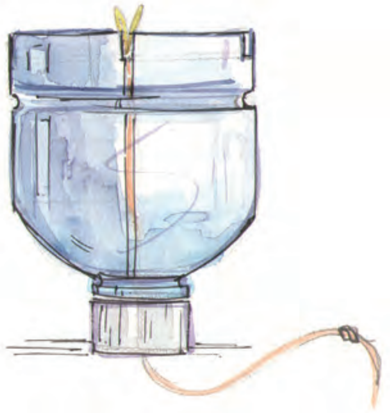
5. Tie a piece of thread to the point where the rubber bands intersect.



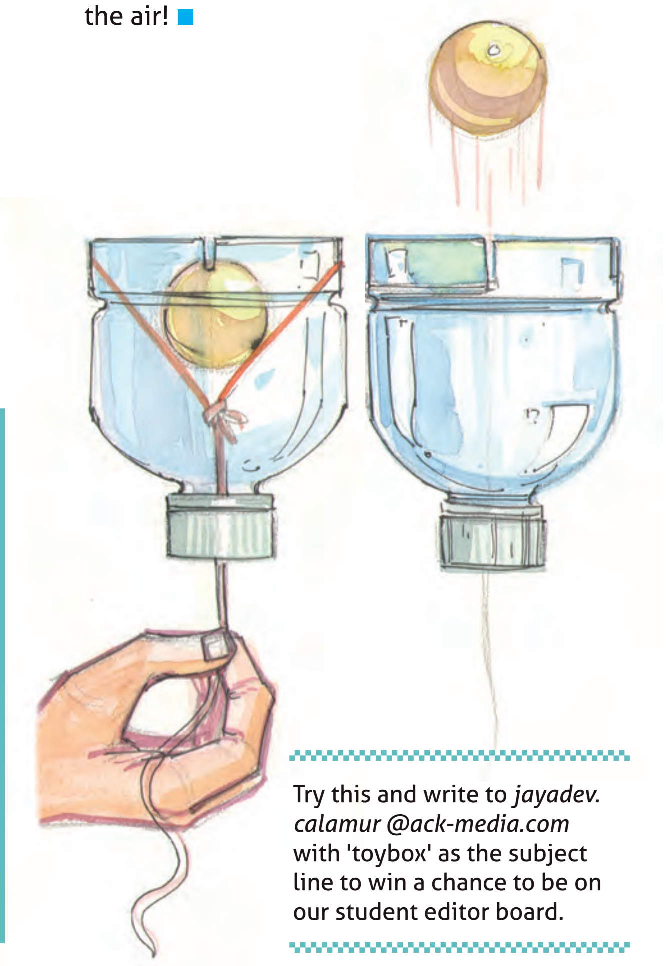
6. Make a tiny hole in the centre of the bottle cap.



7. Pass the thread through the hole from inside the bottle. Tie a knot at the other end.



8. Place a plastic ball on the rubber band junction. Pull the thread down. When you release it, the ball will launch itself high into the air! ■



How It Works

The toy you've built demonstrates the law of conservation of energy. According to this law, the total amount of energy in a system always remains the same; it only changes form. Do you think this will work if you use a lemon or another ball of the same size, but of a different density? Let us know your answers. Write in to *jayadev.calamur@ack-media.com.*

Keeping it Cool!

Just as energy strives to remain constant, our bodies too try to maintain constant temperature levels. So when you exercise, run or jump, and heat is generated, you also start sweating, and this cools the body down. When you have a fever, the body attempts to generate heat through the vibrations of shivering.

Try this and write to *jayadev. calamur @ack-media.com* with 'toybox' as the subject line to win a chance to be on our student editor board.

Artwork: Adarsh Achari

ASK US WHY?

by **Srinath Perur**

THE DEVIL'S TRIANGLE?

Tanvi Nayaken wants to know: "What is the mystery behind the Bermuda Triangle?"

The biggest mystery about the Bermuda Triangle may be that there are some who still consider it a mystery.

Imagine lines drawn between the tip of Florida in the United States, Puerto Rico and the island of Bermuda, and you get the Bermuda Triangle. It's a region in the Atlantic Ocean where ships and aircrafts are supposed to have vanished mysteriously. Reports of disappearances started emerging in the 1950s, and soon after, people came up with possible explanations. Some of them involved aliens whisking away ships and planes, and strange happenings connected with lost civilisations under the sea. Since this is **Brainwave**, we will pay these wild theories no attention.

There were more reasonable explanations offered as well. One theory involved methane gas trapped in large quantities inside ice-like structures on the deep ocean floor. This methane might have bubbled up, causing ships to sink in water that suddenly became less dense. The gas has also been shown to affect the performance of aircraft engines. It was further suggested that a powerful and quick ocean current in the region, the Gulf Stream, may have carried away debris of planes and ships. This could have made it look as if they had vanished.

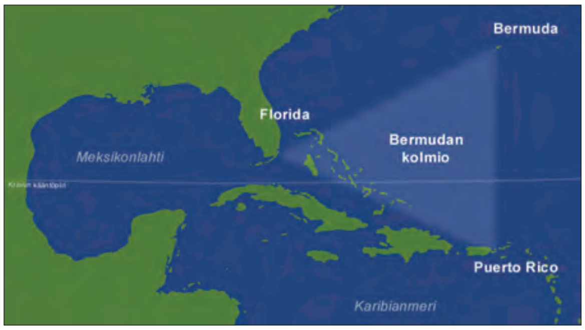


image by Alphaios

Books were written and films made about the Bermuda Triangle mystery. In the 1970s, American pilot Lawrence Kusche investigated the stories of disappearances and found that they were just that – stories. They were either exaggerated, had happened elsewhere, had reasonable explanations or, in some cases, had simply been made up. In other words: there was no mystery. But the idea of an unsolved puzzle still lurks around the Bermuda Triangle (also known as the Devil's Triangle), perhaps because it fascinates people, and helps sell books and movies.

The Bermuda Triangle is an extremely busy air and shipping route. Ships don't sink and planes don't crash there any more than they do in other places. If they did, I may not have been here to write this. I flew over the Bermuda Triangle twice last year, and very smooth flights they were too. ■

Have a question that you would like to ask? Email us at *brainwave@ack-media.com* with 'Ask Us Why' in the subject line.

Trouble brews at Brainwave Labs as Alby falls mysteriously ill. Once again, our shape-shifting science sleuth, Gaia Goel, must crack the case to save the Smarties from illness and contagion

Artwork: Abhijeet Kini

THE CASE OF THE DEAFENING SILENCE

Story by **Jayadev Calamur**
Characters created by **Vinayak Varma**
© **Brainwave**

It is an unusually quiet day at the Brainwave Labs, aka BW Labs, located in one of the secret caves of Dolphin's Nose. Normally, there are a few explosions, followed by screams of joy or despair. However, it's nothing but emptiness today. And the only sound you can hear is of the wind blowing across the Nilgiris.

For Bhoo, such utter silence at the BW Labs means one thing: time to call upon her alter ego, Gaia Goel and inspect.

As she approaches the laboratory, she is overpowered by a noxious smell. "Ewww!" gasps Gaia. "What on earth could that be? I wonder what weird experiments the Smarties are up to."

Meanwhile, all is not well at the BW Labs. Alby is sick. He is pale, shivering and wrapped in three sets of blankets. But despite being cold, sweat pours down his face. He complains of frequent headaches and is often overcome by the compelling urge to vomit.

"How did Alby fall so sick?" mutters Arby looking at his time-travelling companion with surprise.

"It's strange, I agree," nods Skree! gravely. "What could have triggered this off?"

Artwork: Abhijeet Kini

Poor Alby is a sorry sight. Skree! sits by his bedside administering some medicine, but to no avail.

"PTTHHBHHH!" gasps Alby. "That is disgusting. It tastes vile."

"Drink up, Alby, if you want to feel better. It's not like **the world will come to an end**☜ now," Skree! scolds.

"I'm feeling better anyway," grumbles Arby, trying to get out of bed.

Just then, Dr. Dodo enters the room. Looking at Alby trying to get out of bed, he gets cross. "Stay where you are, Alby," he says. Alby has no choice. He lies down and covers himself.

"Oh, I feel so weak," he moans.

"Wonder why, kid?" says a familiar voice.

"Bhoo!" exclaims Dr Dodo in delight.

"Shhhh. I'm on duty. I'm Gaia today," says the private eye.

"How come you're here?" Arby asks.

"I'm here for a reason. I happened to be wandering near the Western Ghats on a case, and realised there were no sounds coming from the lab. I was curious and worried, so here I am."

"Alby's sick," mutters Dr. Dodo. "He definitely has malaria. The symptoms are evident," he adds.

"But we have set some strict hygiene rules at BW Labs. Nobody litters or dumps garbage to attract mosquitoes. So how did he manage to get malaria?" Skree! asks, puzzled.

Gaia notices that Arby is studiously looking away, avoiding her gaze. She catches on immediately and asks, "Arby, how often do you clean your room?"

"He cleans it everyday," replies Skree! without thinking.

"I was asking Arby," says Gaia piercingly.

Artwork: Abhijeet Kini

"I guess once or twice a week," shrugs Arby.

"I thought that we had a deal about your room cleaning," says Skree! sternly. "You're supposed to clean your room everyday. You know that the lab will fall apart if we live in a dirty environment."

"Sorry, Skree!" says Arby. "I was too busy studying that vortex in the Pacific."

> *The dustbin is overflowing with fruit peels and other rubbish. Houseflies are buzzing and feasting on the rotting peels.*

"What vortex in the Pacific*?" asks Gaia, suddenly interested.

"Dr Dodo and I flew down to the Pacific in September and explored the world's biggest dumping ground. After coming home, I didn't clean up," Arby replies.

"But how come Alby has been infected if you were the one who was directly exposed?" Dr Dodo muses.

---

*Read the whole story at *www.bwmag.in/trash-vortex*

“I think that I must have dumped something in Alby’s dustbin after coming home,” Arby replies

“But then, malaria is caused by a mosquito. While Alby seems to have the symptoms of malaria, it looks more like a viral infection now,” Gaia concludes.

“And let me guess,” she adds, “Alby hasn’t cleaned his room either.”

Before the others can respond, Gaia is already in Alby’s room. It’s a mess. There’s paper strewn everywhere. The dustbin is overflowing with fruit peels and other rubbish. Houseflies are buzzing and feasting on the rotting peels.

“Arby, clear up this mess immediately,” scolds Skree!, who has also wandered in for an inspection.

Meanwhile, Gaia decides to further inspect the cave. She goes into the kitchen and sees that it’s spotlessly clean, thanks to Dr Dodo and Skree! She confirms that the water purifier is working properly. With the same zeal, she peers into the refrigerator, sink and storage areas. They are also spic-and-span.

As a final precaution, she also explores the bathroom and the area surrounding the cave to check for any stagnant water. But everything is squeaky-clean. She then joins the other Smarties gathered around Alby, who knows he’s in big trouble.

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“What have we learnt from this, Alby?” prompts Gaia.

“Keep your home, your room and its surroundings clean and hygienic or you can get very sick,” he says.

“Is that all that you have learnt?” asks Dr Dodo.

“What else is there? I’ve suffered enough already,” groans Alby.

“Well, you need to keep yourself clean as well. The next time you or Arby go on a scientific adventure, you need to come home and scrub yourselves clean. You will also make sure that you eat safe and healthy food,” Dr Dodo explains.

“Also,” says Gaia, “the two of you aren’t physically active. If you went out and played some more, you would automatically build your immunity and strength. And this infection could have been avoided.”

A week later, Alby is back in the lab – not yet a 100% okay, but getting there. And yes, he’s now paranoid when it comes to cleanliness, personal hygiene, diet and exercise. ■

Meet the smarties:

Dr Dodo: Dr Dodo is the co-founder of BW Labs and is the last living dodo. He has a certificate in anachronomaly and parallel universes from the University of Clockwindistan. He invented the Galileo series of time machines.

Skree: Skree is the other founder of BW Labs. She loves dangerous experiments. She makes mini black holes before breakfast and has dark matter for lunch.

Arby: Arby is a genius who will grow up to be Aryabhatta. He came to the future, thanks to Dr. Dodo's time machine. He is a fan of numbers, banana fritters and robot wars.

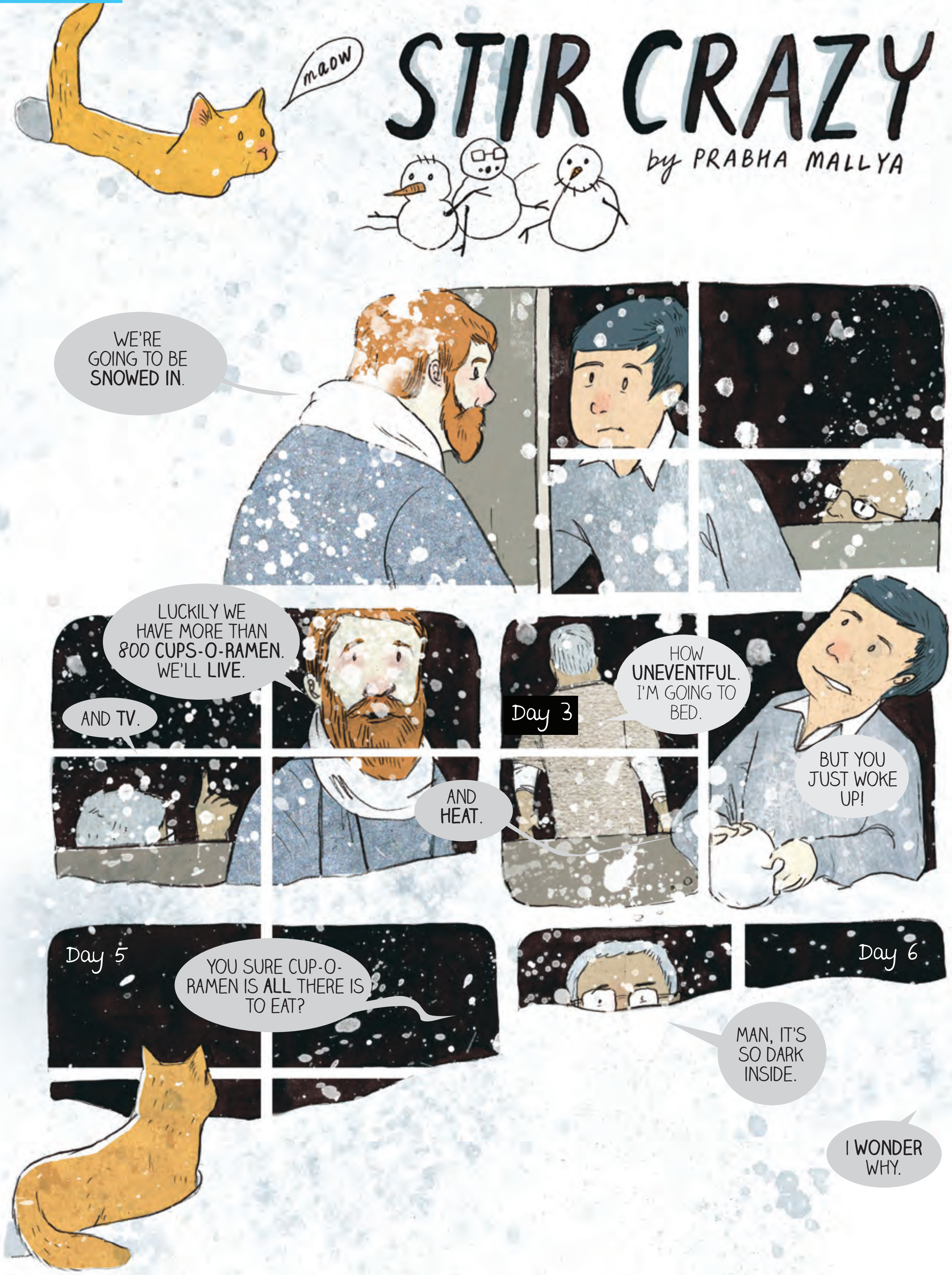
Alby: Alby will grow up one day to be Albert Einstein. However, now, like Arby, he too has been sucked into the future. When he's not researching, he plays the violin.

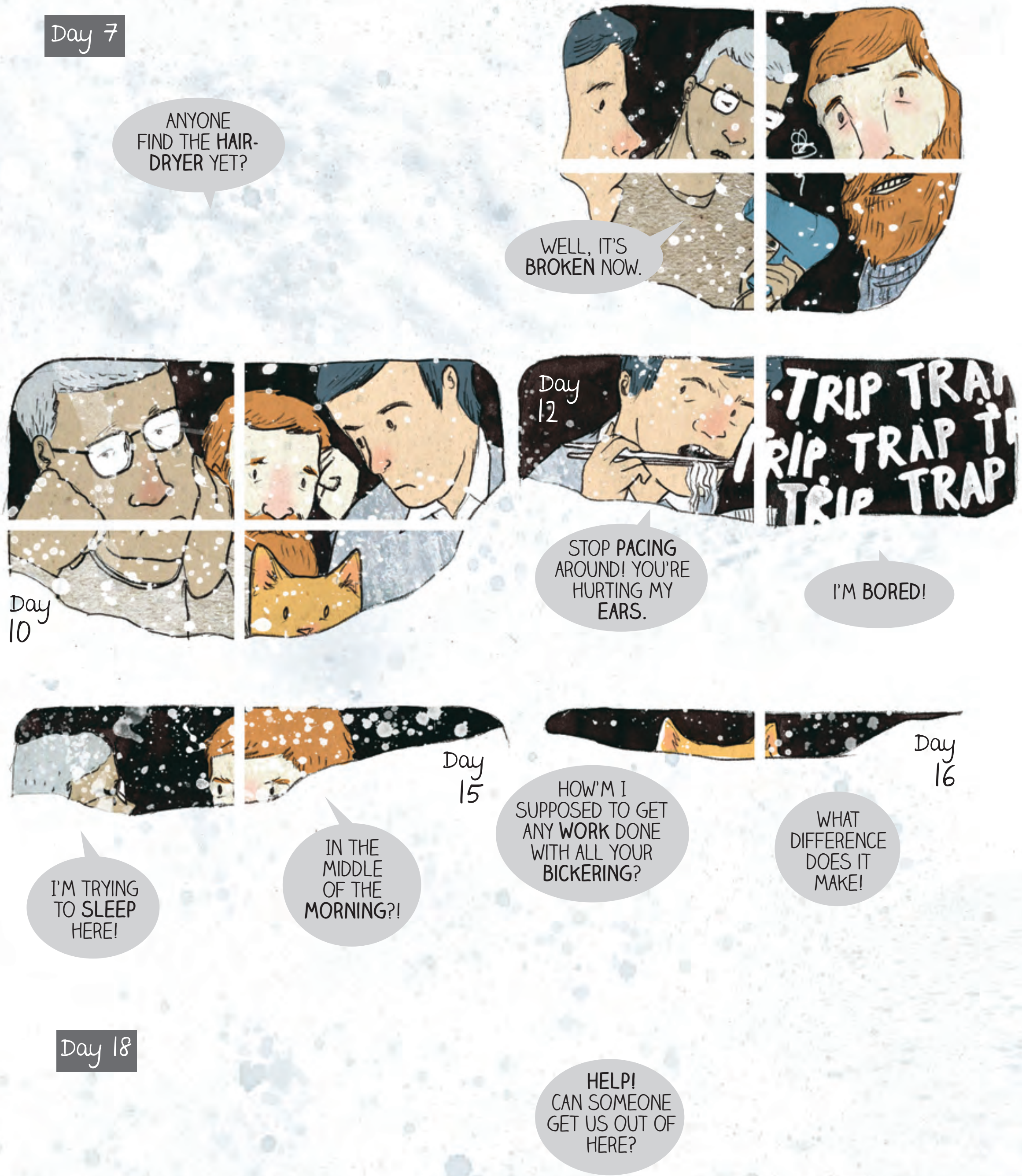
Bhoomi: Bhoomi, aka Bhoo, is an enigma. Where she came from is unknown. We only know that she is made up of earth, wind, fire and water in equal parts. Her alter-ego is Gaia Goel, a world famous science sleuth.

To know more about the Smarties and how they have come to be a part of us, log on to *www.bwmag.in/meet-the-smarties*

STIR CRAZY

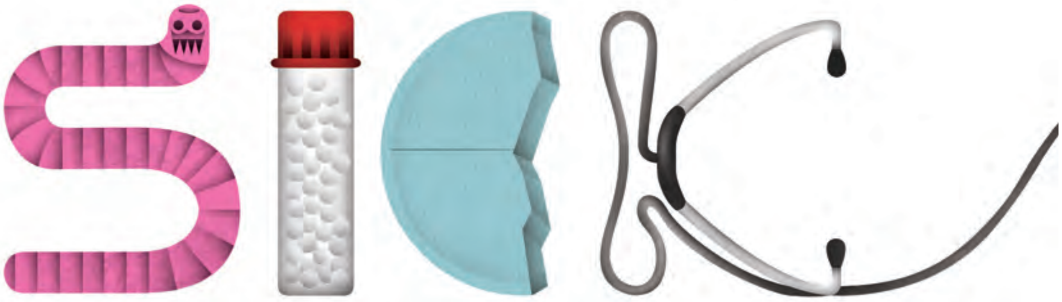
by PRABHA MALLYA


maow
WE'RE GOING TO BE SNOWED IN.
LUCKILY WE HAVE MORE THAN 800 CUPS-O-RAMEN. WE'LL LIVE.
AND TV.
AND HEAT.
Day 3
HOW UNEVENTFUL. I'M GOING TO BED.
BUT YOU JUST WOKE UP!
Day 5
YOU SURE CUP-O-RAMEN IS ALL THERE IS TO EAT?
Day 6
MAN, IT'S SO DARK INSIDE.
I WONDER WHY.


Day 7
ANYONE FIND THE HAIR-DRYER YET?
WELL, IT'S BROKEN NOW.
Day 10
Day 12
STOP PACING AROUND! YOU'RE HURTING MY EARS.
TRIP TRAP TRIP TRAP TRIP TRAP
I'M BORED!
Day 15
I'M TRYING TO SLEEP HERE!
IN THE MIDDLE OF THE MORNING?!
HOW'M I SUPPOSED TO GET ANY WORK DONE WITH ALL YOUR BICKERING?
Day 16
WHAT DIFFERENCE DOES IT MAKE!
Day 18
HELP! CAN SOMEONE GET US OUT OF HERE?

CABIN FEVER: EXTREME IRRITABILITY AND RESTLESSNESS FROM LIVING IN ISOLATION OR A CONFINED INDOOR AREA FOR A PROLONGED TIME. - *Merriam-Webster dictionary*

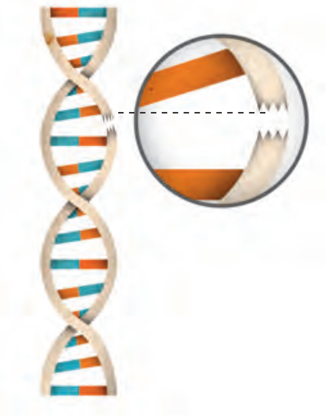
...62 days to the spring snowmelt.
Just sayin'.



by **Kayomarz Bacha**
& Somesh Kumar

Diseases are of two types:

Congenital diseases are transmitted from one generation to another due to genetic deformities.

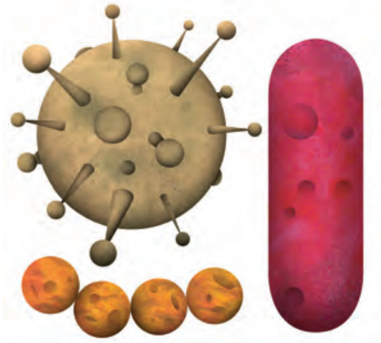


Acquired diseases develop after birth. They are again of two kinds:

Communicable diseases are passed from an infected person to a healthy person. They are also called infectious diseases and can be transmitted by:

Non-communicable diseases are caused by a deficiency of nutrients, vitamins or minerals, or because certain body parts stop functioning.

Bacteria
Found in soil, water, air and food, they cause bacterial infections. Examples are diphtheria, tetanus, typhoid, tuberculosis, pneumonia, food poisoning and whooping cough.



Viruses
Only seen under an electron microscope, they multiply rapidly on entering another living cell. Polio, rabies, chickenpox, measles, influenza (viral fever, swine flu), conjunctivitis, mumps, hepatitis (jaundice), common cold and AIDS are viral infections.

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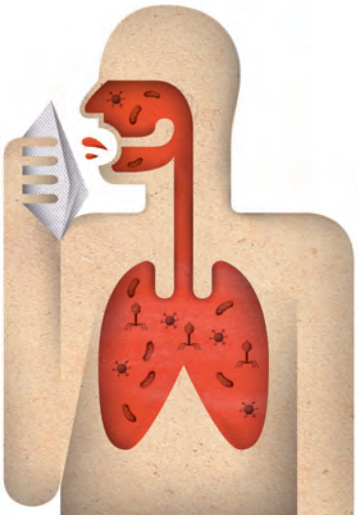
Communicable diseases spread through five sources:

Air
Bacteria and viruses that infect the nasal passage, windpipe and lungs are present in the saliva of an infected person. This is why you should always cover your nose when you sneeze or cough. Examples are common cold, influenza, TB and diphtheria.



Vectors
They only carry the disease, but aren't affected themselves. Mosquitoes causing diseases like malaria and dengue are examples.

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WORLD

Mapping the types of diseases, their causes and the deadly agents that spread them

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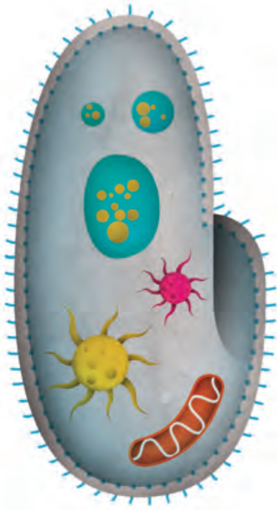
Fungi

Cause skin diseases like ringworm and athlete's foot (a condition where there is excessive itching between toes and on the heel)

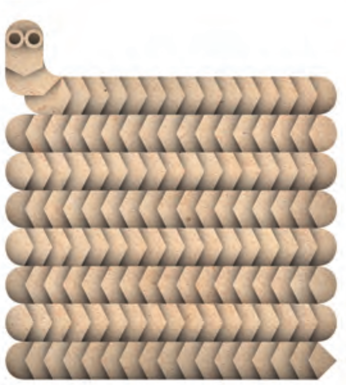
Protozoa

Cause amoebic dysentery and malaria



Parasites

Enter the system through food and sap the body of its nutrients. Tapeworms and ringworms are parasites.



Water

Drinking water that hasn't been boiled or filtered can lead to an infection. Public swimming pools are another source. Waterborne diseases include typhoid, dysentery, cholera and hepatitis.

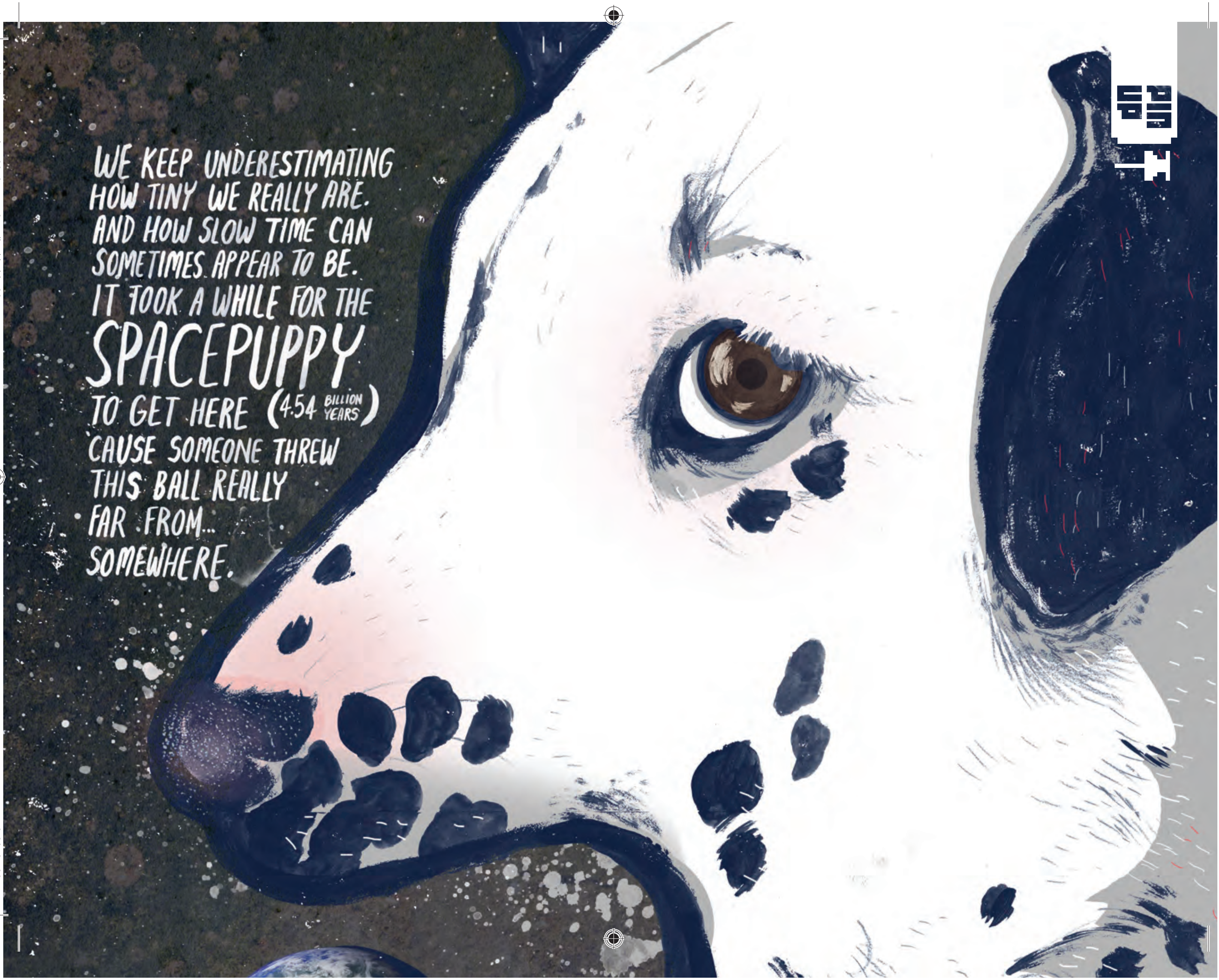
Food

Fresh vegetables and fruits which are not washed properly can cause stomach infections. Eating stale or rotten food can also result in food poisoning, as can canned food. Bacteria that gain entry into the cans multiply in the absence of air. Non-pasteurised milk and meat that isn't cooked properly are sources of infection as well.

Physical Contact

Some fungal and viral infections spread through physical contact. Ringworm and scabies are fungal infections, while chickenpox and conjunctivitis are viral infections. People suffering from these diseases should be kept in isolation. ■

If you had any of the above mentioned diseases, write to kayomarz.bacha@ack-media.com and tell him how you and your parents tackled them.


WE KEEP UNDERESTIMATING
HOW TINY WE REALLY ARE.
AND HOW SLOW TIME CAN
SOMETIMES APPEAR TO BE.
IT TOOK A WHILE FOR THE
SPACEPUPPY
TO GET HERE (4.54 BILLION YEARS)
'CAUSE SOMEONE THREW
THIS BALL REALLY
FAR FROM...
SOMEWHERE.

AND THAT WAS THE END OF the WORLD

by **Prabha Mallya**

THE NATURAL EXTERMINATOR

by **Kayomarz Bacha**

Keep mosquitoes and their bites at bay with Brainwave's easy and effective homemade repellent

List of ingredients

- 10ml Eucalyptus oil (₹20)*
- 200ml sunflower oil (from your kitchen)
- A small funnel
- A sprayer

Step 01

Mix 1 part Eucalyptus oil (essential oil[G]) with 10-20 parts sunflower oil (carrier oil[G]). So, if you use 10ml of Eucalyptus oil, use 100 or 200ml of sunflower oil.

Step 02

Rub the natural repellent onto your skin. Avoid sensitive areas like the eyes.

Step 03

Spray the repellent on your clothes if you want. Spray it on curtains, bedsheets etc.

Step 04

Re-apply it after about an hour. Oil tends to get absorbed by the skin, so the repellent's effect may wear off.

Artwork: Adarsh Achari

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*Can be bought at any medical store

Step 05

Unused natural repellent can be stored in a dark bottle away from heat or sunlight.

Caution: If you have skin allergies, please check with your parents before you do this!

Benefits of natural mosquito repellent

1. Homemade mosquito repellent is a simple recipe requiring only a few ingredients. It is easy to make, not too time-consuming and cost-effective as well.
2. The recipe can be adjusted according to your choice of fragrance, and the accessibility and availability of oils and other ingredients.
3. Many commercial bug repellents contain chemicals or active ingredients, a cause of concern for some. However, the homemade bug repellent is entirely natural and does not have harmful side-effects. It can be safely used on children and animals.
4. Apart from protecting your skin from bugs, the repellent can also be used around your home. Repellent-soaked cotton balls can be placed in drawers and closets to infuse clothing with the scent of Eucalyptus.

Artwork: Adarsh Achari

How does it work?

Essential oils penetrate the skin easily, and can be carried through the blood and tissues within minutes.

Essential oils play an important role in increasing oxygen supply to the limbic system[G], particularly the pineal[G] and the pituitary glands[G]. More the oxygen, faster is the rate at which antibodies[G], neurotransmitters[G] and endorphins[G] are produced.

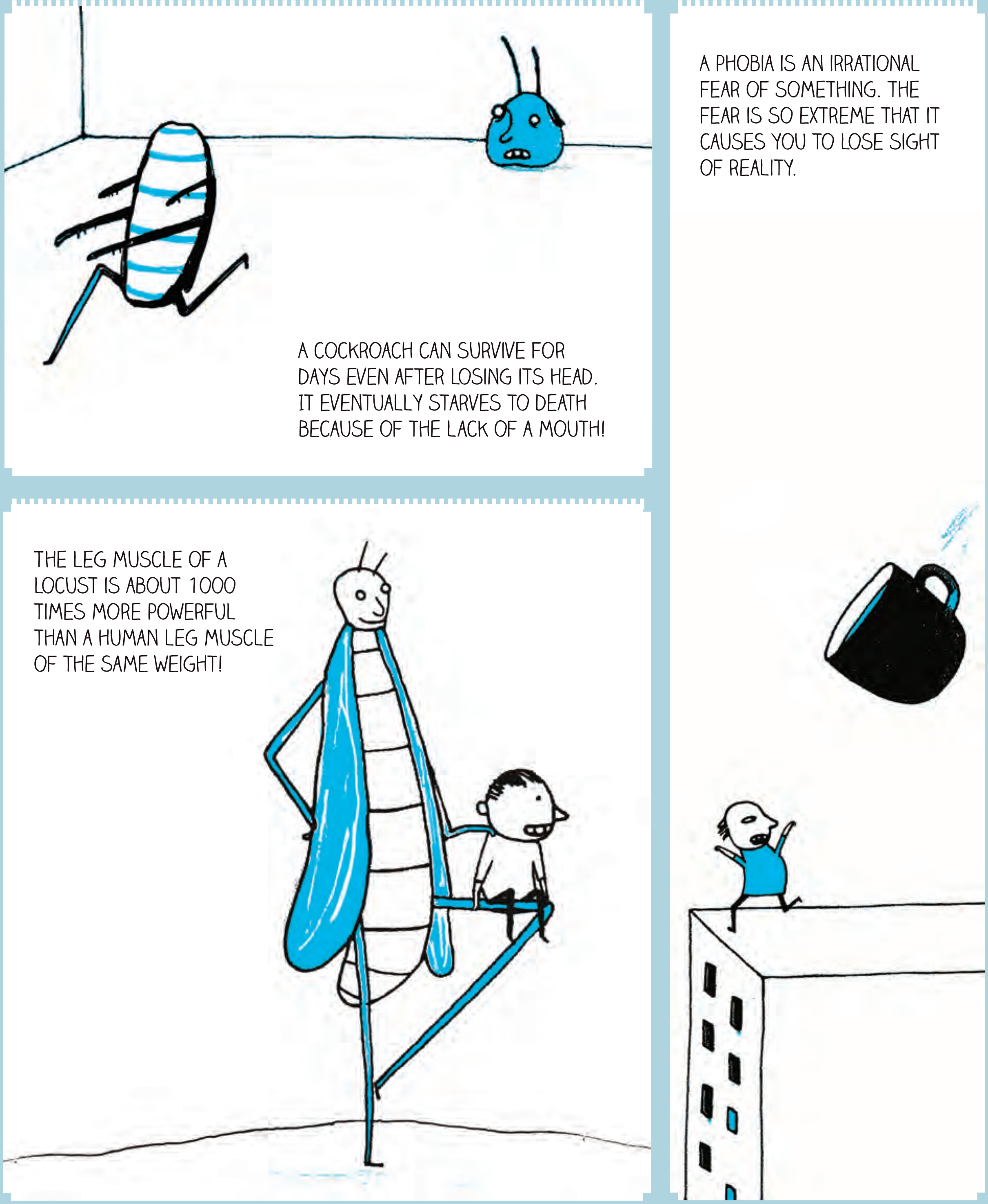
It has been proved that essential oils stimulate the amygdala in the brain. This part of the brain stores your emotions. Anger, fear, sadness and joy, all originate here! Some believe that smelling an essential oil can also help us release fears. ■

The repellents available in the market use chemicals to last longer. But you can also make your natural repellent last longer by using Catnip oil. However, Catnip oil emits a foul odour and is not easily available in stores. It can be ordered from *www.amazon.com*, though.

After you have tried this out, let me know how it worked for you. Write to me at kayomarz.bacha@ack-media.com and you might even win a surprise gift!

TOON TALK

by **Upasna Menhdiratta**


A COCKROACH CAN SURVIVE FOR DAYS EVEN AFTER LOSING ITS HEAD. IT EVENTUALLY STARVES TO DEATH BECAUSE OF THE LACK OF A MOUTH!
A PHOBIA IS AN IRRATIONAL FEAR OF SOMETHING. THE FEAR IS SO EXTREME THAT IT CAUSES YOU TO LOSE SIGHT OF REALITY.
THE LEG MUSCLE OF A LOCUST IS ABOUT 1000 TIMES MORE POWERFUL THAN A HUMAN LEG MUSCLE OF THE SAME WEIGHT!

CLEAN IT UP!

UH-OHH!
HA HA HA HA!
CHOCO LOVE
WOOPSIE!

Artwork: Alicia Souza

by **Aparna Kapur**

Let's face it. Being sloppy comes naturally to all of us. It can be fun too – so long as we don't get caught in the act, of course. Say you spilled coffee on the living room curtain, or that pesky kid in your neighbourhood was guffawing with his mouth open while chewing gum and now it's stuck to your carpet. Whatever will you do? Follow these quick tips and any careless leaks and spillages will be instantly erased!

Sloppy Scenario: **You're holding a candle over a carpet, making shadows on the wall. You tilt it a bit to see better and... oops!**

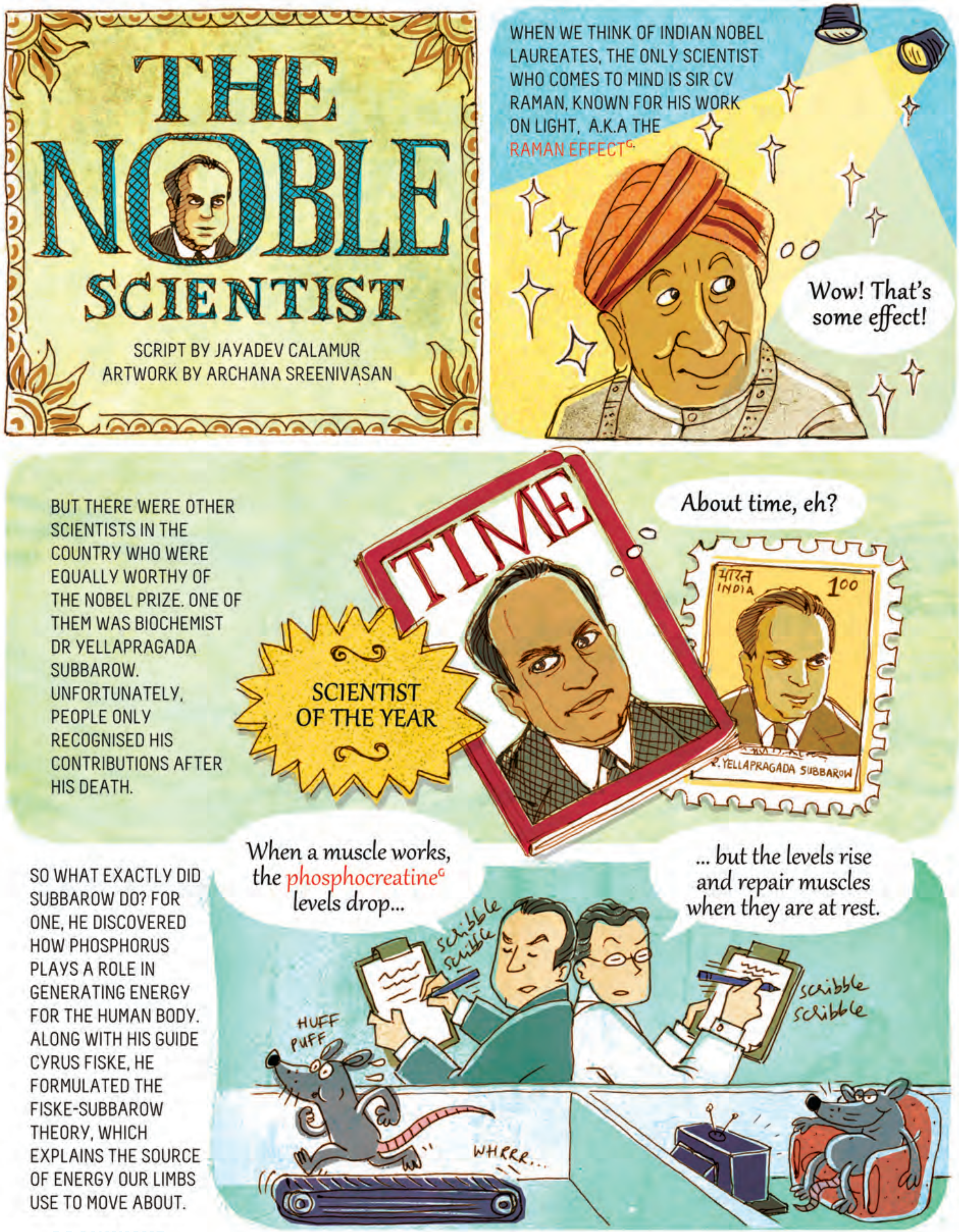
Use a blunt knife to scrape off as much of the candle wax as you can. Next, put a clean sheet of paper over it. Take a warm clothes iron and press it over the sheet of paper. The heat will melt the wax, while the paper protects the carpet. The melted wax then gets absorbed on to the sheet of paper and off the carpet.

Gross Scenario: **You're talking to your friend, and a sudden snort of laughter causes him to spit his gum on the curtain. Ewww!**

The good news is that you can get rid of that gross, sticky mush that gets stuck to your clothes, shoes and carpets. We have found its weakness: the cold! To get rid of unwanted chewing gum blobs, all you have to do is freeze them. Place a cube of ice over the piece of gum. It will harden and you'll be able to pick it off.

Clumsy Scenario: **You're happily walking with a big mug of chocolate milk, but you bump into the table and, uh oh!**

A few drops of liquid detergent mixed with lukewarm water can get rid of coffee or tea stains. A tougher stain can be removed using a vinegar-salt solution. ■



THE NOBLE SCIENTIST

SCRIPT BY JAYADEV CALAMUR
ARTWORK BY ARCHANA SREENIVASAN

WHEN WE THINK OF INDIAN NOBEL LAUREATES, THE ONLY SCIENTIST WHO COMES TO MIND IS SIR CV RAMAN, KNOWN FOR HIS WORK ON LIGHT, A.K.A THE RAMAN EFFECT[G].

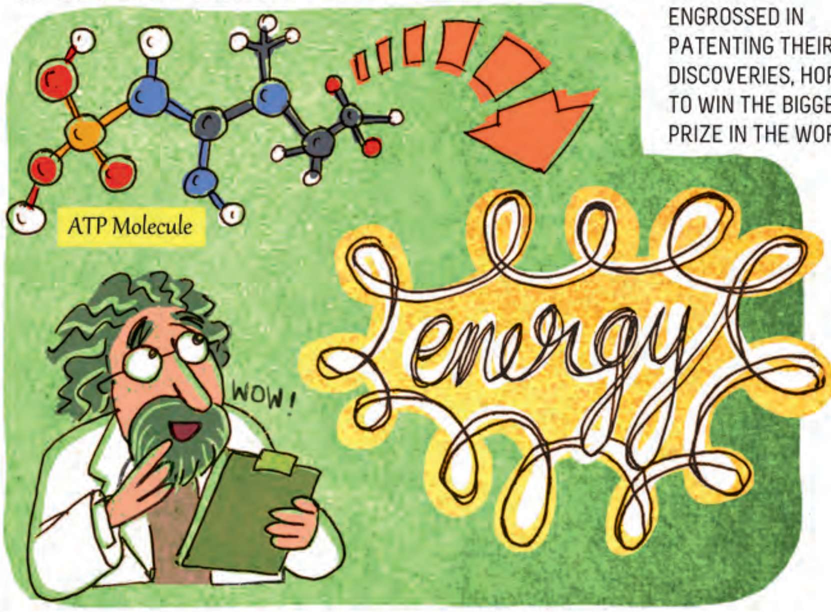
Wow! That's some effect!

BUT THERE WERE OTHER SCIENTISTS IN THE COUNTRY WHO WERE EQUALLY WORTHY OF THE NOBEL PRIZE. ONE OF THEM WAS BIOCHEMIST DR YELLAPRAGADA SUBBAROW. UNFORTUNATELY, PEOPLE ONLY RECOGNISED HIS CONTRIBUTIONS AFTER HIS DEATH.

SO WHAT EXACTLY DID SUBBAROW DO? FOR ONE, HE DISCOVERED HOW PHOSPHORUS PLAYS A ROLE IN GENERATING ENERGY FOR THE HUMAN BODY. ALONG WITH HIS GUIDE CYRUS FISKE, HE FORMULATED THE FISKE-SUBBAROW THEORY, WHICH EXPLAINS THE SOURCE OF ENERGY OUR LIMBS USE TO MOVE ABOUT.

When a muscle works, the phosphocreatine[G] levels drop...
... but the levels rise and repair muscles when they are at rest.
scribble scribble
scribble scribble
HUFF PUFF
WHRRR...

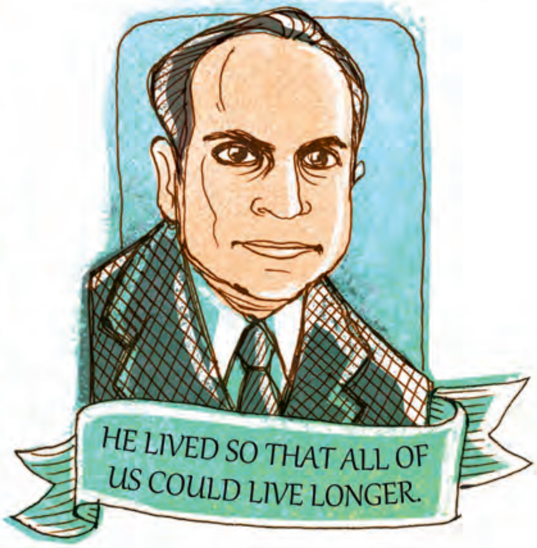
AFTER SEVERAL TESTS, THE DUO DISCOVERED THAT THE SOURCE OF ENERGY THAT POWERS THE BODY AND ITS MUSCLES IS 'ATP', SHORT FOR ADENOSINE TRIPHOSPHATE, FROM WHICH PHOSPHOCREATINE IS PRODUCED. GIVEN THE IMPORTANCE OF THIS DISCOVERY, YOU MAY WONDER WHY SUBBAROW DIDN'T WIN A NOBEL PRIZE IN MEDICINE.



THE ANSWER IS SIMPLE: SUBBAROW NEVER PATENTED HIS WORK! MOST OTHER SCIENTISTS OF HIS ERA WERE ENGROSSED IN PATENTING THEIR DISCOVERIES, HOPING TO WIN THE BIGGEST PRIZE IN THE WORLD.

BUT DID SUBBAROW CARE? NO! HE WENT ON DOING HIS WORK AND MAKING LIFE BETTER FOR OTHERS. THROUGH THE 1940S, HE FIGURED OUT HOW FOLIC ACID COULD BE SYNTHESISED TO HELP PEOPLE SUFFERING FROM PERNICIOUS ANAEMIA, DISCOVERED A DRUG TO CONTROL FILARIASIS, AND DEVELOPED AN ANTI-CANCER DRUG.

IDEALLY, HIS WORK SHOULD HAVE WON HIM THREE OR FOUR NOBEL PRIZES! HOWEVER, A TEACHER IN MADRAS TAUGHT SUBBAROW TO SERVE MANKIND – WHICH HE DID. AND HOW!


HE LIVED SO THAT ALL OF US COULD LIVE LONGER.

DREAM MACHINES

by **Payal Dhar**

A round-up of some utterly cool, new tech that is making life healthier and better

Crazy Gadget: Desk Workout

A German-made exercise gadget is wagging its finger at naughty adults who want to avoid exercising, and sit and work all day. Called OfficeGym, this fitness tool is targeted at grown-ups whose jobs involve sitting in one place for long periods of time. Doing so can be dangerous to health as the human body is not designed to sit for more than eight hours. How does OfficeGym work? By attaching itself to the backrest of any upright chair, it lets users work out without having to leave their desks. The makers also claim that it can be used by people of all age groups, provided they have no existing physical problems.

Artwork: Kashmira Sarode

But even though the Osteopathy Association of Southern Germany has given OfficeGym its stamp of approval, doctors and fitness experts agree that if you're really concerned about your health, there is no substitute for getting up and working out. And considering the OfficeGym costs about ₹10,000, a daily walk doesn't sound like such a bad idea, does it?

Emerging Tech: Race Past Light

Faster-than-light-travel – a concept called 'warp-drive travel' – is no more a fantasy. Scientists from the National American Space Agency (NASA) now claim that this technology might be more plausible that we thought.

Most of us know about the warp-drive from *Star Trek*, *Doctor Who* and *Mass Effect*.

> *Faster-than-light-travel – a concept called 'warp-drive travel' – is no more a science fiction fantasy. Scientists from the National American Space Agency (NASA) now claim that this technology might be more plausible that we thought.*

But back in 1994, Mexican physicist Miguel Alcubierre demonstrated that this kind of travel was indeed theoretically possible. It could be achieved by enclosing a spaceship in a 'normal' spacetime bubble and distorting spacetime around it. However, it remained beyond the scope of human know-how and required insane amounts of energy to work.

But last month, scientist Harold White, and his team at NASA's Johnson Space Center announced that according to their calculations, the energy requirements might have been exaggerated. The amount of energy needed can be reduced drastically if the shape of the spacetime bubble is changed.

However, this doesn't imply that we should start packing our spacesuits right away. Realistically, there are many problems that need solving, and warp-drive travel is unlikely to happen in our lifetimes.

Sci-Trend: Robo-doc to the Rescue

In a medical emergency, even a few seconds can make the difference between life and death. Telepresence robotics, a branch of robotics technology that allows a doctor to treat patients remotely, could go a long way in making this difference and saving lives. One example of this is the 'Remote Presence Virtual + Independent Telemedicine Assistant' (RP-VITA) robot-doctor, unveiled in July 2012 and currently on trial in California. This robot will not only give doctors remote access to their patients, but also perform tasks like accessing patient records and carrying out remote examinations.

The RP-VITA has been jointly created by robotics firm, iRobot, and telemedicine specialist, InTouch Health. It is remotely operated with – believe it or not – a simple iPad user interface!

Medicine has dreamed of telepresence robots for almost a hundred years. And now robo-docs are no more just a fantasy. ■

Artwork: Kashmira Sarode

MAILED TALES

A Smelly Affair

When I was in Standard 7, I had this annoying habit of smelling everything that was put in front of me. The habit, unfortunately, carried into the chemistry lab in school as well. I would open each bottle, sniff the contents, appreciate some of the smells and get grossed out by others.

But all this changed one day.

I had entered the lab earlier than usual and spotted an amber-coloured bottle, marked 'N'. Thinking it was nitrogen, I thought to myself, "Cool! I wonder what it smells like," and opened the bottle to investigate. The next thing I remember was feeling as if someone had slapped me across my face. I was wheezing and gasping for breath, when the teacher entered the lab and asked me what I was up to. I told her that I wanted to know what nitrogen smelt like. She burst out laughing and told me that I had just smelt ammonia!

It's an incident that I still remember today. And I've never forgotten the lesson it taught me: to think a million times before I smell anything!

Patanjali Pahwa
Via email

Editor's note: Liquid ammonia is available as ammonium hydroxide in the laboratory. It has a strong pungent odour.

Artwork: Parvati Pillai

Something Fishy

In Class 8, I entered the laboratory for the first time. It was chemistry practicals hour and the teacher explained the concept of acids and bases. She demonstrated the litmus paper test and all of us were delighted to see blue litmus paper turn red for the acid and red litmus test turn blue for the base. After the demonstration, most of my classmates returned to the classroom, but three of us stayed back to explore the lab. In the process, we ended up having a little adventure.

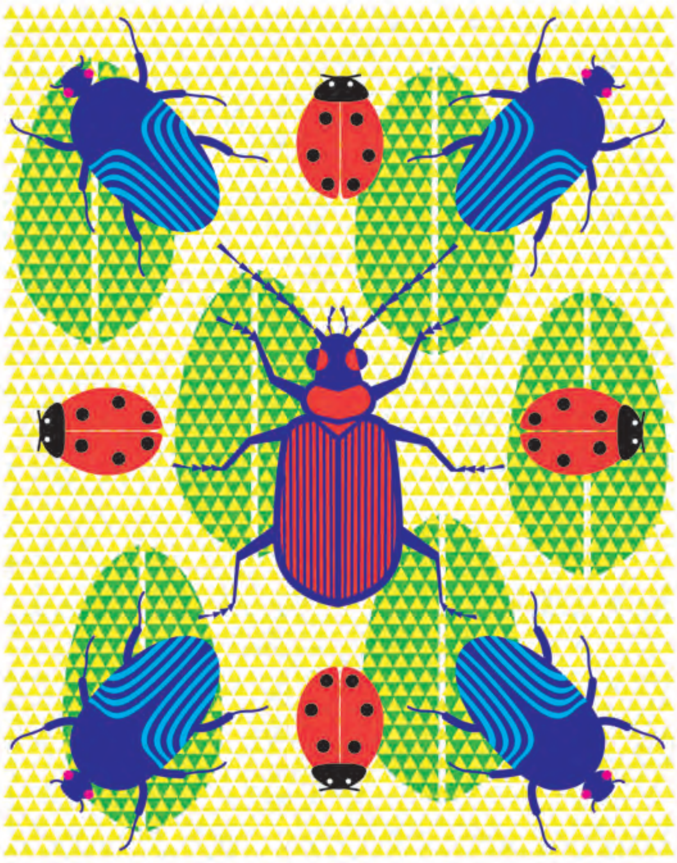
The teacher was busy correcting some journals with her back to us. So I took a test tube and put some sulphuric acid in it and mixed some nitric acid as well. Unfortunately, the result was a foul-smelling disaster. Smelling something fishy, the teacher turned around and caught us red-handed. Thankfully, we were let off with a warning. But it's a lesson I've learnt and will remember for the rest of my life.

Shalvi Mangaokar
Via email

Editor's note: Stay away from acids and alkalis in the laboratory unless a teacher is supervising you. You could burn yourself if you're careless.

Listen to the Buzz

by **Aparna Kapur**



Artwork: Kashmira Sarode

Artwork: Parvati Pillai

A scientist isn't just a person who sits in a lab, conducts experiments and gathers data. Anyone who observes things, asks questions, and looks for answers to satisfy an insatiable sense of curiosity is a scientist. It's time to see if that's the stuff you're made of! So, young scientists, do you feel up to our challenge?

Here's what you have to do. Look at the insects around you. Sure, they can fly and most of them have six legs. But what else do you know about these bugs? You don't have to study them under a microscope to know more. All you have to do is watch carefully. Look at three insects around you. They could be insects you see at home or at the garden. Select five features that are unique about each insect. It could be anything ranging from the wings of the insect to the way it consumes food.

So take a notebook and pencil and start jotting down your findings. Email them to us at *jayadev.calamur @ack-media.com,* with 'Observation Activity' in the subject line. The most comprehensive entry will win a surprise gift from us. ■

The Good, Bad and the Ugly

by **Kayomarz Bacha**

Enter the invisible and mystifying realm of microbes

Injections are not injurious

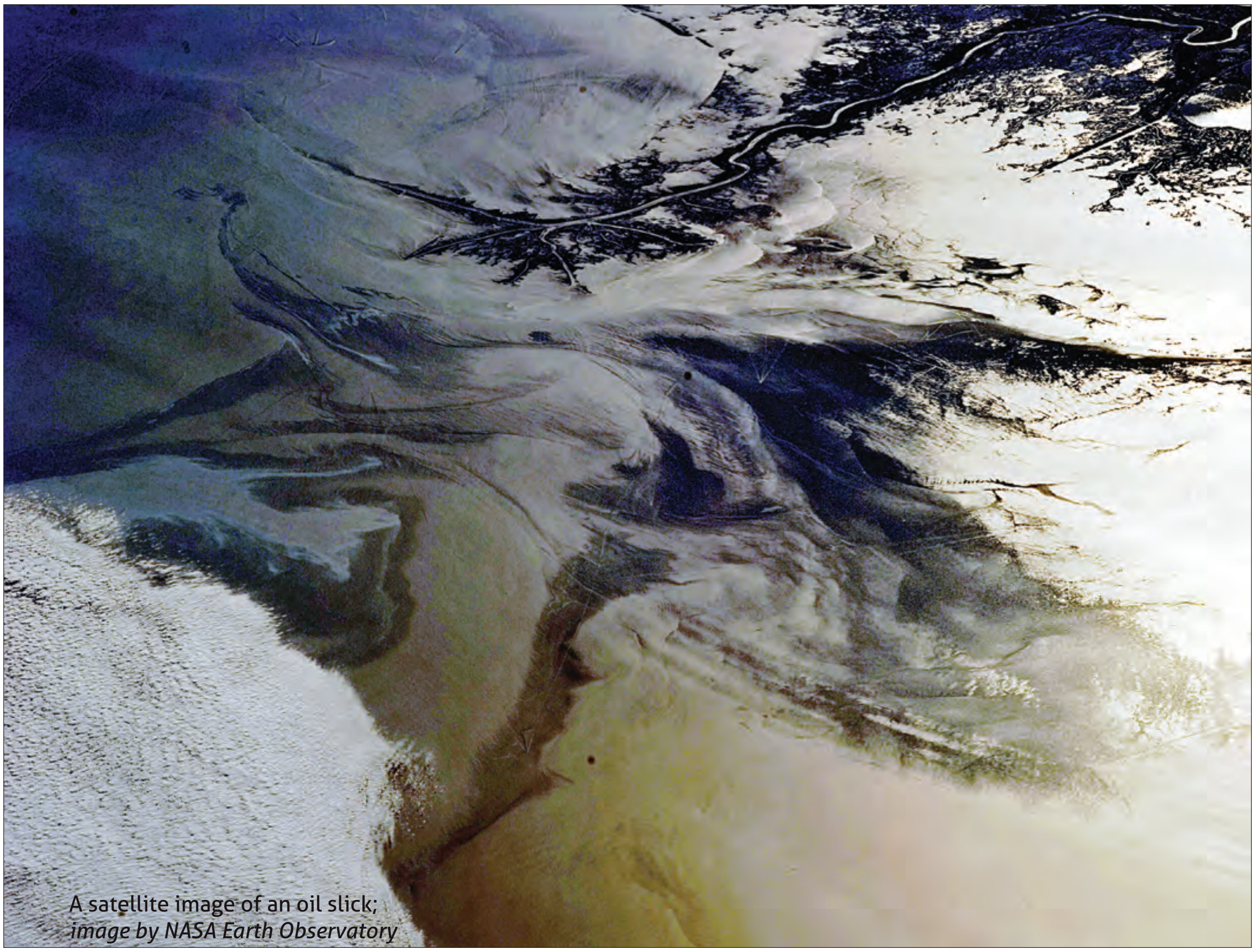
Have you ever wondered why your parents get panicky when you fall off your bicycle or scratch yourself on a rusted nail? You hope against hope that they won't use the dreaded I-word. But once you hear it, you know what's in store: a trip to the doctor for a frightening tetanus injection. But why is all this necessary? What does a tetanus shot do? Well, it prevents tetanus, a condition caused by *Clostridium tetani*, a bacterium found in soil. It affects the central nervous system[G], if ignored after an injury. By attaching itself to the nerves around a wound, it moves to the brain or the spinal cord where it disrupts nerve activity. Thankfully, you don't have to get a tetanus injection every time you get injured. You probably need a shot once every 10 years, but some recommend taking it every two to three years. Now that you've read this, you may think twice before arguing with your parents about getting a tetanus shot!

Doggone crazy

When we think rabies, we think dog bite. The virus is a deadly one and can be fatal to those affected by it, if not treated in time. So when an affected animal – in most cases, a dog – bites a human, the virus travels through the peripheral nerves (the nerves of the brain and the spinal cord) and reaches the central nervous system. Moms and dads tell us "not to play with stray dogs, as they may be infected" and their worries are justified. Municipalities across India take dogs to the pound, administer a rabies vaccine and then release them, so that they aren't a menace to people.

However, dogs aren't the only carriers of the rabies virus. There are several other warm-blooded animals that also do, including bats, monkeys, wolves and foxes. According to a statistic, 89 people died of rabies between 1925 and 1935, thanks to rabies-infected bats in the West Indies. Recently, a

Photograph: Jon Hurd

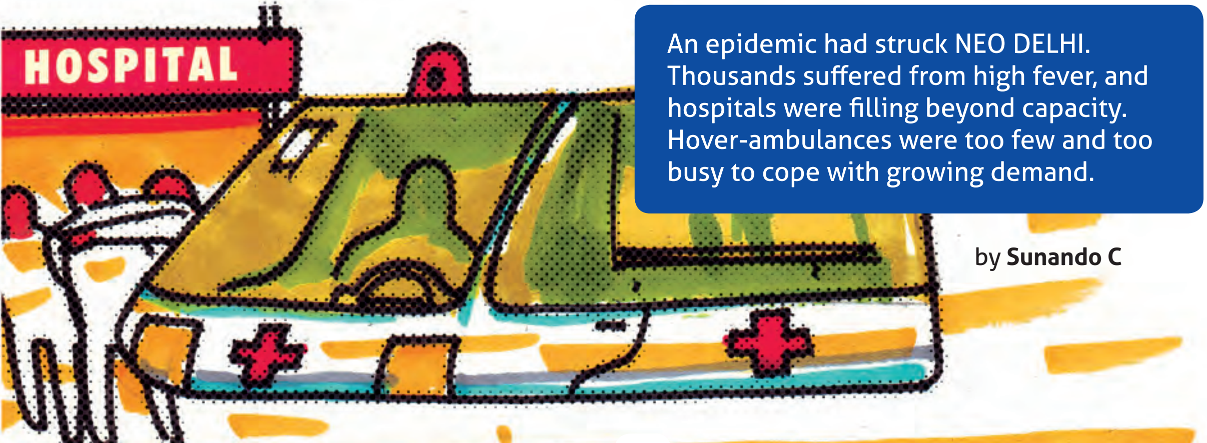


A satellite image of an oil slick; *image by NASA Earth Observatory*

19-year-old Mexican lost his life after being bitten by a rabid vampire bat in the United States. So maybe the authorities need to check on other animals for being potential rabies threats.

Goody-goody bacteria

All bacteria aren't bad! We already know this, don't we? Probiotics[G] are available in stores, and we regularly consume good old curd, made out of lactobacilli. But now, scientists have discovered cooler kinds of bacteria. Remember the major oil spill off the Gulf of Mexico in 2010, which resulted in a thick layer of oil settling itself on the sea? Well, it seems that five months after the horrible accident, a type of bacteria called the marinobacter (bacteria found in the sea), consumed 200,000 tonnes of oil and natural gas that formed the oil slick! This variety of bacteria feeds on hydrocarbon, the main component of oil and petrol. While the idea of eating petrol sounds disgusting, just think of how this weird dietary habit has rescued marine life from the effects of the oil slick and kept the sea from getting contaminated. Researchers calculated the quantity and the rate of oil and natural gas consumed by measuring how much oxygen had been removed from the ocean. "When bacteria consume oil and gas, they use up the oxygen and release carbon dioxide. This removes the oxygen from the water," one of the scientists conducting the study was quoted as saying in a news publication. But will marine life get affected because of the loss of oxygen? Thankfully not, as there are a number of marine plants on the ocean floor that release oxygen back to the water. ■



An epidemic had struck NEO DELHI. Thousands suffered from high fever, and hospitals were filling beyond capacity. Hover-ambulances were too few and too busy to cope with growing demand.

by **Sunando C**

An epidemic occurs when new cases of a certain disease, in a given human population and during a given period, substantially exceed what is expected.

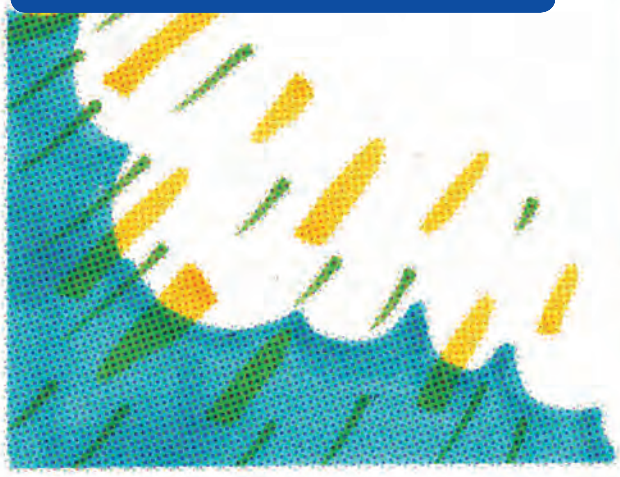
DR MOHAN MARVELL: The Super Scientist had been in his lab for days now, trying to come up with a cure.

After all manner of tests, he surmised that it was a viral airborne pathogen – a microorganism such as a virus, bacterium or fungus that causes disease in its host – had been carried by the air and infected Neo Delhi's citizens.

To combat this pathogen, Mohan Marvell would have to create an antigen – a substance that evokes the production of one or more antibodies.

An antibody is a large Y-shaped protein produced by a type of white blood cell called a plasma cell. The production of antibodies is the main function of the immune system. Antigens enable antibodies to identify and destroy foreign objects such as bacteria and viruses.

A cure developed, Mohan Marvell flew high above Neo Delhi. He pumped out large quantities of this formula into the air to reach the maximum number of people through atmospheric dispersion!



END

CHASING THE COMMON COLD

Story by **Sasikanth C**
Characters created by **Vinayak Varma**
© **Brainwave**

BW Labs has shrunk Arby and Alby to microscopic proportions for their next assignment. Their miniscule bodies have been placed onto a microscopic slide for an exclusive interview with Rhino the Virus, a specimen of the common cold virus. They're not too happy about it, though, given that Alby has just recovered from a nasty viral infection

Arby and Alby report live from the headquarters of Rhino the Virus. Over and out!

Alby and Arby pick their way gingerly along the mucky slide.

"Try not to cough or sneeze," mutters Alby.

"Speak for yourself, dude," Arby quips. "You're the one who has just recovered from a viral."

"Don't remind me," grumbles Alby. "I don't know why Skree! sent us to this death trap. Just for an interview!" he continues to rant. "Don't they know that I've just gotten better? Then they shrink me to look like a microorganism, and now here I am, about to interview a virus!" he snaps.

"Shhh…we're here!" gestures Arby.

As the duo approach the lair of Rhino the Virus, they're afraid of the outcome once they're done.

"Sir, may we come in?" they ask.

The virus is quite a sight. He is seated on a throne with an assortment of smaller viruses fanning him. While he is invisible to the human eye, he looms over the newly-shrunken Alby and Arby. "I've been expecting you. Don't worry, I know why you're here. I will not infect you," he says, much to Alby's relief.

"So, what do you have to ask me, boys?" asks the virus.

"Sir, tell us something about yourself," says Arby.

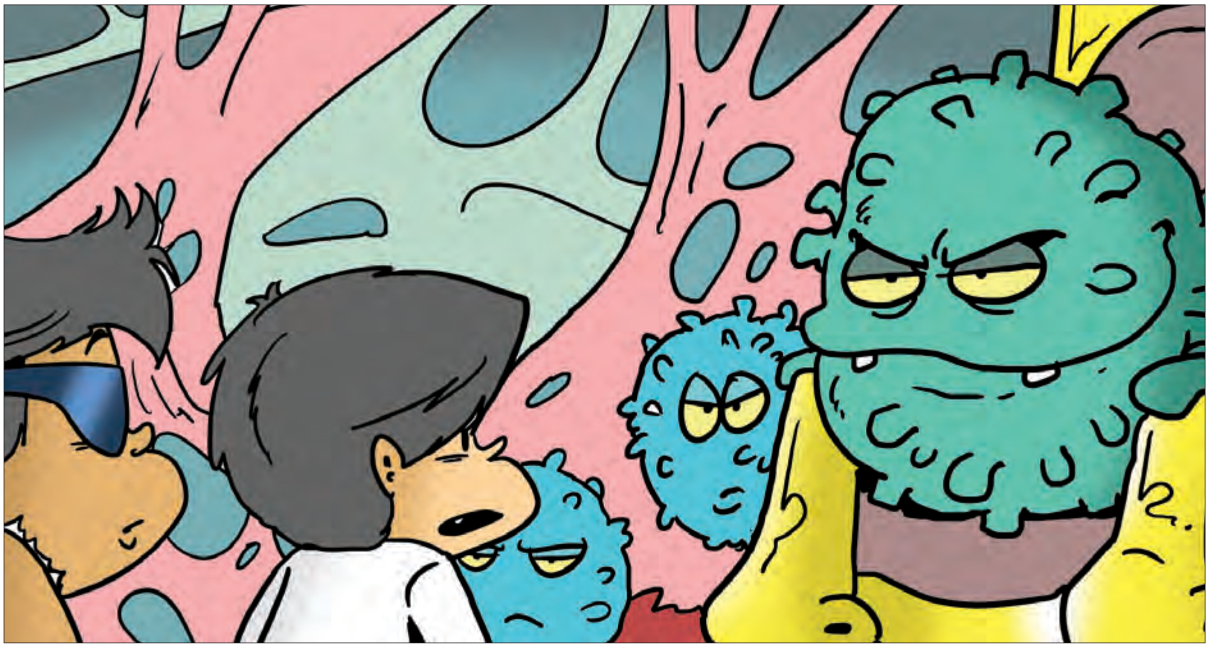
"Well, I am called the rhinovirus and I am the most common virus found in humans. I am the primary reason why all you humans get what you call, a common cold."

"But then, if so many ancient ailments like the smallpox have been eliminated, how come the common cold is still the most common infection in the world?" interrupts Arby.

"Ah! That's the magic of the virus. We adapt faster than other organisms and develop resistance as soon as the host[G] – in this case the human nose – tries to eliminate us. As of today, there are 99 variants of the rhinovirus that infect people. The more you try and resist us, the more variants we come up with," finishes the rhinovirus with a booming laugh.

"So, what you're trying to say is that as long as the human race exists, so will the common cold?" Alby asks indignantly. "Of course," scoffs the virus. "Human evolution has been a short

Artwork: Abhijeet Kini



Artwork: Abhijeet Kini

thing compared to how long we've been around."

"And how long is that?" Arby asks.

"Well, viruses were some of the first organisms on Earth. They came much before the dinosaurs even. To be honest, it was such a long time ago that even I cannot remember. There are several types of viruses, you see, and each of them evolved over a period of time. There are theories that they can bring **the world to an end**,☜ but that will only be seen over time."

"Wow!" says Arby, astonished.

"So how do you operate?" Alby asks.

"Well, I live inside the noses of people with colds. The temperature inside a nose is ideal for my growth — about 37 degrees celsius. When a person coughs or sneezes, I come out in a spray and find another host to enter. There are many like me, so we're on the move all the time. If the person we enter doesn't have resistance to us, then he or she gets a cold."

"That's why we're supposed to cover our noses when we cough or sneeze!" exclaims Arby.

"Precisely!" the virus agrees.

"Why is it that no vaccine has been developed against the rhinovirus? There have been vaccinations for other viral infections," says Alby.

"That's a very good question, Alby," nods the virus in approval. "But it's very difficult to make a vaccine because of our adaptability. Every time humans try to make a vaccine for a common cold, we adapt to a newer form, so I think that research is still ongoing. However, I don't see it happening in either of your lifetimes."

"Well, that's all we had to ask you. We'll be heading back up now, Mr... uhhh... Rhino. Thanks again," Arby says.

"My pleasure. And try and avoid catching me anytime soon. Bye!" ■

SOLUTIONS AND WINNERS

Solution to Cross Section, Oct 2012: Tick, Tick, BOOM!

		C				S			C
B	L	A	S	T		H	E	A	L
O		N				E			O
Y		N	O	B	E	L			U
		O				L	E	A	D
D	U	N	G				N		
I			R	A	N	G	E		G
R			E				R		U
T	I	M	E		A	R	G	O	N
Y			N				Y		

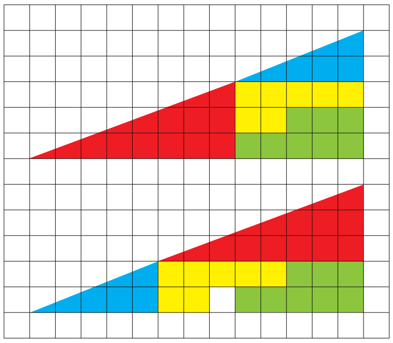
Solution to Plus Minus, Oct 2012: One by Two

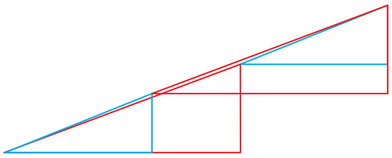
1. The numbers 1 through 20 are written in a row. Two players take turns putting plus signs and minus signs randomly, between the numbers. When all such signs have been placed, the final sum is calculated. If the sum is even, the first player wins and if the sum is odd, the second player wins. Would you like to be the first or second player?

Solution: Try playing the game with a friend. After a few rounds you will find out that the first player always wins! So you need to be the first player to win. The question is *why* is the first player guaranteed to win? Whether the sum is even or odd does not depend on the position of the pluses or minuses, but only on the number of odd integers in the original set of numbers. Since there are 10 odd integers to begin with, and 10 is an even number, the first player will win. I am sure now you know who will win if you play the game with the numbers 1 through 21 in a row!

2. Why is the square missing in the picture below ?

Solution: The key to this puzzle is that neither of the two 13x5 right-angled triangles in the upper and lower figures is truly a triangle. This is because the apparent hypotenuse (side opposite the right angle) is very, very slightly bent. The four shapes (blue, yellow, green and red) that make up the triangle, have a total area of 32 units, whereas if the big triangle were truly a 13x5 triangle, it would have an area of 65/2 = 32.5 units. However, the hypotenuse of the blue triangle has a slope of 5:2 =2.5 :1, while the red triangle has a slope of 8:3 = 2.667:1. This slight mismatch of slopes (which is hard to be detected by the eye) causes the combined hypotenuse to be bent. Carefully note the grid point where the red and blue hypotenuses meet in the upper figure and compare it with the same point in the lower figure. You will notice that the edge is slightly over or under the mark. Overlaying the hypotenuses from both figures will give you a thin parallelogram of area exactly equal to one grid square, which is the area missing from the bottom figure. Now you may feel a bit cheated thinking this is more of an optical illusion than a maths puzzle, but the idea is that you can figure out it is an optical illusion by using the properties of triangles!





For a more detailed discussion, see *www.marktaw.com/blog/TheTriangleProblem.html*

Solution to Puzzle Popper, Oct 2012: A leaf on a tree

Here's how Ajjamma's clues helped Radha map her family tree:

Meera married Shamanna and had two children, Goda and Ramaswamy.

Goda married Prakash and had two children, Yamini and Srinivas.

Ramaswamy married Susheela and had two children, Subhashini and Yashoda. ■

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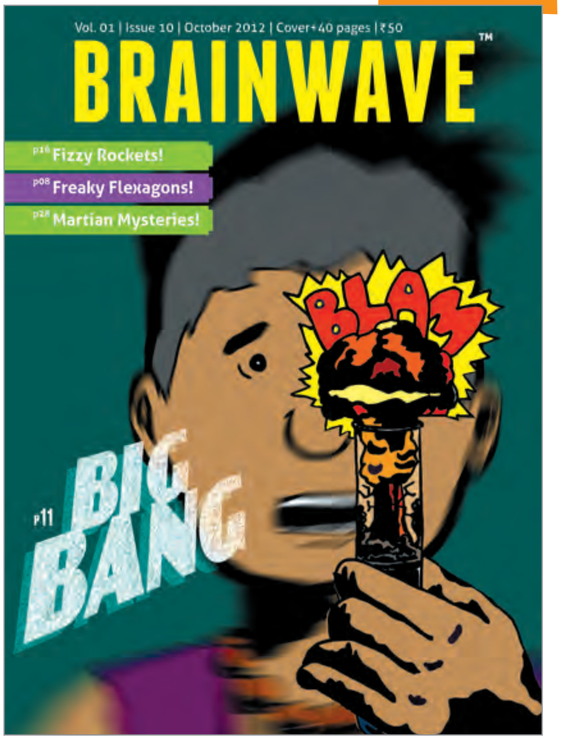

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SCIENCE GLOSSARY

p06

Mussel: the common name used for organisms from the family of molluscs (family comprising snails) found in salt and freshwater

p22

Essential oil: a natural oil typically obtained by distillation and having the characteristic fragrance of the plant or other source from which it is extracted

Carrier oil: also known as base oil or vegetable oil; used to dilute essential oils

p23

Limbic system: a complex system of nerves and networks in the brain that controls basic emotions and drives the brain

Pineal gland: a pine-cone-shaped gland in the brain that produces several hormones

Pituitary gland: master gland of the hormonal system; located at the base of the brain

Antibodies: proteins produced by the blood inside mammals to fight foreign infections

Neurotransmitter: a substance that transmits signals across nerves through the body

Endorphins: a group of hormones secreted within the brain and nervous system that have a number of physiological functions

p26

Raman effect: change in the wavelength of light that occurs when a light beam is deflected by molecules

Phosphocreatine: an organic compound found in the muscles of vertebrates, which releases energy for muscles to contract

p32

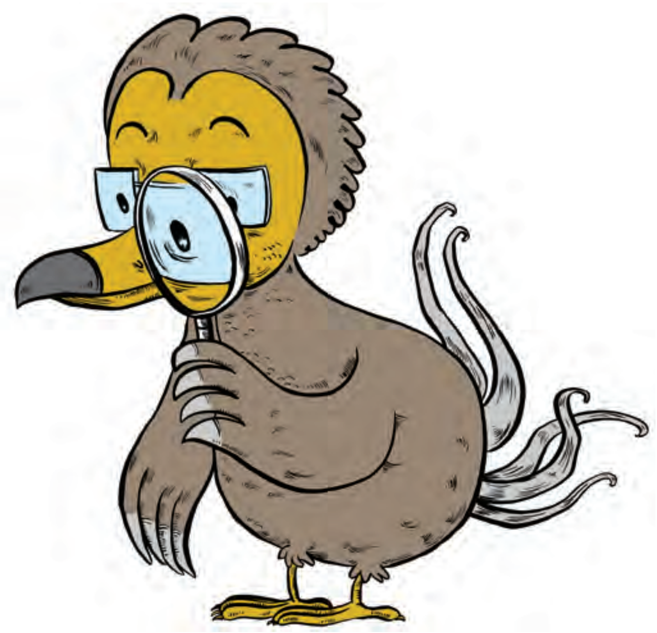
Central nervous system: the mass of nerve tissues that controls the activities of the body. In vertebrates, it comprises the brain and spinal cord

p33

Probiotic: a microorganism introduced into the body through food to make a person healthier

p37

Host: an organism that harbours an invader – usually a virus, bacteria or a worm – typically providing nourishment and shelter



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